Amendments To The Claims

The listing of claims presented below will replace all prior versions, and listings, of claims in the application.

Listing of claims:

1. (**Currently Amended**) A connection switching device for implementing Optical Channel Shared Protection Ring (Och-SPRing), ~~which is~~ used in a node ~~nodes~~ of an optical network system with a working path and a backup path, comprising:

~~two switches~~ a first and a second switch, each of ~~which~~ the first switch and the second switch has two unidirectional input ports and one unidirectional output port, and one of the input ports ~~can be~~ of the first switch is connected to the output port of the first switch under the control of the first switch, one of the input ports of the second switch is connected to the output port of the second switch under control of the second switch;

~~wherein,~~ wherein one input port of the first switch connects to and receives downlink service signals from a downlink direction of the working path, the other input port of the first switch connects to and receives the downlink service signals from a downlink ~~the downlink~~ direction of the backup path, and the output port of the first switch connects and outputs the downlink service signals to a local drop path;

one input port of the second switch connects to and receives uplink service signals from a local add path, the other input port of the second switch connects to and receives the downlink service signals from the downlink direction of the backup path and the output port of the second switch connects to an uplink ~~the uplink~~ direction of the backup path; and

the local add path is connected with an uplink ~~the uplink~~ direction of the working path at the same time.

2. (**Currently Amended**) The connection switching device according to claim 1, ~~wherein,~~ wherein under normal modes of the connection switching device, the input

port, which connects to the downlink direction of the working path, of the first switch, is connected to the output port of ~~itself~~**the first switch**;

under local drop modes, the input port, which connects to the downlink direction of the backup path, of the first switch, is connected to the output port of ~~itself~~**the first switch**;

under local add modes, the input port, which connects to the local add path, of the second switch, is connected to the output port of ~~itself~~**the second switch**; and

under express modes, the input port, which connects to the downlink direction of the backup path, of the second switch, is connected to the output port of ~~itself~~**the second switch**.

3. (**Currently Amended**) The **connection switching** device according to claim 1, wherein~~, both of~~ the **first switch**~~switches~~ **and the second switch** of the device can be one of the three available combinations:

both of the first and the second switches are optical switches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch.

4. (**Currently Amended**) The **connection switching** device according to claim 2, wherein~~, both of~~ the **first switch**~~switches~~ **and the second switch** of the device can be one of the three available combinations:

both of the first and the second switches are optical switches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch.

5. (**Currently Amended**) A connection switching device for implementing Optical Channel Shared Protection Ring (Och-SPRing), applied in unidirectional **service** ~~services~~ drop function of **a node in** ~~the node in the~~ **an** optical network system **with a**

~~with the~~ working path and a backup ~~the backup~~ path, comprising:

a first switch, which has two unidirectional input ports and one unidirectional output port, and one of the input ports of the first switch ~~can be~~ is connected to the output port of the first switch under control ~~the control~~ of the first switch; one input port of the first switch connects to and receives downlink service signals from a downlink direction of the working path, the other input port of the first switch connects to and receives the downlink service signals from a downlink ~~the downlink~~ direction of the backup path, and the output port of the first switch connects and outputs the downlink services signals to a local drop path; and

a second switch, which has one unidirectional input port and one unidirectional output port, and the input port of the second switch ~~can be~~ is open or close to the output port under the control of the second switch; the input port of the second switch connects to and receives the downlink service signals from the downlink direction of the backup path, the output port of the second switch connects and outputs the downlink service signals to an uplink ~~the uplink~~ direction of the backup path.

6. **(Currently Amended)** The connection switching device according to claim 5, ~~wherein, wherein~~ under normal ~~the normal~~ modes of the connection switching device, the input port, which connects to the downlink direction of the working path, of the first switch, is connected to the output port of ~~itself~~ the first switch;

under the ~~under the~~ local add modes, the input port, which connects to the downlink direction of the backup path, of the first switch, is connected to the output port of ~~itself~~the first switch; and

under ~~under the~~ express modes, the input port of the second switch, is connected to the output port of ~~itself~~the second switch.

7. **(Currently Amended)** The connection switching device according to claim 5, wherein ~~, both of~~ the first switch ~~switches~~ and the second switch of the connection switching device can be one of the three available combinations:

both of the first and the second switches are optical switches; and, the first

switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch.

8. (**Currently Amended**) The **connection switching** device according to claim 6, wherein~~, both of~~ the **first switch** ~~switches~~ **and the second switch** of the **connection switching** device can be one of the three available combinations:

both of the first and the second switches are optical switches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch.

9. (**Currently Amended**) A connection switching device for implementing Optical Channel Shared Protection Ring (Och-SPRing), applied in unidirectional **service** ~~services~~ add function of **a node** ~~the node in the~~ **in an** optical network system **with the** ~~with the~~ working path and **a backup** ~~the backup~~ path, comprising:

a switch, which has two **unidirectional** input ports and one **unidirectional** output port, and one of the input ports ~~can be~~ **is** connected to the output port under the control of the switch; one input port of the switch connects to **and receives uplink service signals from a local** ~~the local~~ add path, the other input port **of the switch** connects to **and receives downlink service signals from a downlink** ~~the downlink~~ direction of the backup path, and the output port **of the switch** connects **and outputs the downlink service signals or the uplink service signals** to **an uplink** ~~the uplink~~ direction of the backup ~~path; wherein,~~ **path, and**

the local add path is connected to **an uplink** ~~the uplink~~ direction of the working path at the same time.

10. (**Currently Amended**) The **connection switching** device according to claim 9, wherein:

under **local** ~~the local~~ add modes, the input port, which connects to the local add

path, of the switch, is connected to the output port of ~~itself~~**the switch**; and

under **express** ~~the express~~ modes, the input port, which connects to the downlink direction of the backup path, of the switch, is connected to the output port of ~~itself~~**the switch**.

11. (**Currently Amended**) The **connection switching** device according to claim 9, wherein: ~~both of~~ the **switch** ~~switches of the device can be~~ **is any** one of **an optical switch, an electric switch, and a logical switch** ~~the three available combinations: both of the first and the second swithes are optical swltches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch~~.

12. (**Currently Amended**) The **connection switching** device according to ~~claim 1~~**claim 10**, wherein ~~, both of~~ the **switch** ~~switches of the device can be~~ **is any** one of **an optical switch, an electric switch, and a logical switch** ~~the three available combinations:~~

~~both of the first and the second switches are optical switches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch~~.

13. (**Currently Amended**) An optical network system for implementing Optical Channel Shared Protection Ring (Och-SPRing), comprising a bi-directional working path and a bi-directional backup path, wherein:

a bi-directional service transmission-reception node in the system comprises two identical connection switching devices, ~~each of which~~ **respectively connect** ~~connects~~ with the working path and the backup path ~~of the working path~~ in one **direction** ~~by the same connection method~~, and each of the connection switching **devices** ~~device~~

comprises: **a first switch ~~two switches~~ and a second switch**, each of **~~which~~ the first switch and the second switch** has two **unidirectional** input ports and one **unidirectional** output port, and one of the input ports **of the first switch ~~can be~~ is** connected to the output port **of the first switch** under the control of the **first** switch, **one of the input ports of the second switch is connected to the output port of the second switch under control of the second switch**; one input port of the first switch connects to **and receives downlink service signals from** a downlink direction of the working path, the other input port **of the first switch** connects to **and receives the downlink service signals from a downlink ~~the downlink~~** direction of the backup path, and the output port **of the first switch** connects **and outputs the downlink service signals** to a local drop path; one input port of the second switch connects to **and receives uplink service signals from** a local add path, the other input port **of the second switch** connects to **and receives the downlink service signals from** the downlink direction of the backup path and the output port **of the second switch** connects **and outputs the uplink service signals or the downlink service signals** to **an uplink ~~the uplink~~** direction of the backup path; the local add path is connected with **an uplink ~~the uplink~~** direction of the working path at the same time;

an unidirectional service transmission-reception node in the system comprises one connection switching device used for unidirectional service drop, and one connection switching device used for unidirectional service add;

the connection switching device used for unidirectional service drop comprises: a first switch, which has two **unidirectional** input ports and one **unidirectional** output port, and one of the input ports **~~can be~~is** connected to the output port under the control of the **first** switch; one input port of the first switch connects to **and receives downlink service signals from the downlink ~~a downlink~~** direction of the working path, the other input port **of the first switch** connects to **and receives the downlink service signals from** the downlink direction of the backup path, and the output port of the first switch connects **and output the downlink service signals** to **the local ~~a local~~** drop path; a second switch, which has one **unidirectional** input port and one **unidirectional** output port, and the input port **of the second switch ~~can be~~is** open or close to the output port

of the second switch under the control of the **second** switch; the input port of the second switch connects to **and receives the downlink service signals from** the downlink direction of the backup path, the output port **of the second switch** connects **and outputs the downlink service signals** to the uplink direction of the backup path; and

the connection switching device used for unidirectional service add comprises: one switch, which has two **unidirectional** input ports and one **unidirectional** output port, and one of the input ports ~~can be~~**is** connected to the output port under the control of the switch; one input port of the switch connects to **and receives the uplink service signals from** the local add path, the other input port connects to **and receives the downlink service signals from** the downlink direction of the backup path, and the output port connects **and outputs the uplink service signals or the downlink service signals** to the uplink direction of the backup path; the local add path is connected to the uplink direction of the working path at the same time.

14. **(Currently Amended)** The **optical network** system according to claim 13, wherein~~,~~ as to the connection switching device in the bi-directional service transmission-reception node in the system, under **normal** ~~the normal~~ modes, the input port, which connects to the downlink direction of the working path, of the first switch, is connected to the output port of ~~itself~~**the first switch**; under **local** ~~the local~~ drop modes, the input port, which connects to the downlink direction of the backup path, of the first switch, is connected to the output port of ~~itself~~**the first switch**; under **local** ~~the local~~ add modes, the input port, which connects to the local add path, of the second switch, is connected to the output port of ~~itself~~**the second switch**; under **express** ~~the express~~ modes, the input port, which connects to the downlink direction of the backup path, of the second switch, is connected to the output port of ~~itself~~**the second switch**;

as to the connection switching device applied in **unidirectional** ~~the unidirectional~~ service drop in the unidirectional service transmission-reception node in the system, under the normal modes, the input port, which connects to the downlink direction of the working path, of the first switch, is connected to the output port of

~~itself~~**the first switch**; under the local add modes, the input port, which connects to the downlink direction of the backup path, of the first switch, is connected to the output port of ~~itself~~**the first switch**; under the express modes, the input port of the second switch, is connected to the output port of ~~itself~~**the second switch**; and

as to the connection switching device applied in **unidirectional** ~~the unidirectional~~ service add in **an unidirectional** ~~the unidirectional~~ service transmission-reception node in the system, under the local add modes, the input port, which connects to the local add path, of the switch, is connected to the output port of ~~itself~~**the switch**; under the express modes, the input port, which connects to the downlink direction of the backup path, of the switch, is connected to the output port of ~~itself~~**the switch**.

15. (**Currently Amended**) The **optical network** system according to claim 13, ~~wherein,~~ **wherein** the node of the system further comprises: ~~at least one~~ **a first** Optical Add Drop Multiplexing (OADM) unit, ~~whose~~ **an** input port **of the first OADM unit** connects with **a transmission** ~~the transmission~~ optical fiber in the optical network system, and is used for dividing **optical** ~~the optical~~ signals input through the optical fiber according to their wavelengths, and then transmitting the signals to the working path and the backup path; and

~~at least one~~**a second** OADM unit, ~~whose~~ **an** output port **of the second OADM unit** connects with the transmission optical fiber in the optical network system, and is used for combining **optical** ~~the optical~~ signals of different wavelengths output through the working path and the backup path, and then transmitting the signals to the **transmission** optical fiber.

16. (**Currently Amended**) The **optical network** system according to claim 15, wherein~~,~~ the two OADM units, which connect the same optical fiber in the system, are further directly connected with each other through **a transmission** ~~the transmission~~ path, which is used for **express** ~~the express~~ processing on the optical signals which have no interactions with the node.

17. (**Currently Amended**) The **optical network** system according to claim 13, wherein~~, both of~~ the **first switch ~~switches~~ and the second switch** of the **connection switching** device ~~can be~~**is** one of the three available combinations:

both of the first and the second switches are optical switches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch.

18. (**Currently Amended**) The **optical network** system according to claim 14, wherein~~, both of~~ the **first switch ~~switches~~ and the second switch** of the **connection switching** device ~~can be~~**is** one of the three available combinations:

both of the first and the second switches are optical switches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch.

19. (**Currently Amended**) The **optical network** system according to ~~any of claim15~~**claim 15**, wherein ~~, both of~~ the **first switch ~~switches~~ and the second switch** of the **connection switch** device ~~can be~~**is** one of the three available combinations:

both of the first and the second switches are optical switches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch.

20. (**Currently Amended**) The **optical network** system according to ~~any of~~ claim 16, wherein ~~, both of~~ the **first switch ~~switches~~ and the second switch** of the **connection switching** device ~~can be~~**is** one of the three available combinations:

both of the first and the second switches are optical switches; and, the first switch is an electric switch in an Optical Transformation Unit (OTU), and the second

switch is an optical switch; and, the first switch is a logical switch, and the second switch is an optical switch.

21. (**Currently Amended**) A method for implementing Optical Channel Shared Protection Ring (Och-SPRing), ~~which can be~~ applied to **an optical** ~~the optical~~ network system with **a working** ~~the working~~ path and **a backup** ~~the backup~~ path, comprising:

controlling **a first** ~~the first~~ switch to receive **downlink** ~~the downlink~~ service signals from the working path or the backup path ~~When~~ **when** receiving the signals, **wherein the first switch has two unidirectional input ports and one unidirectional output port, one input port of the first switch connects to and receives the downlink service signals from a downlink direction of the working path, the other input port of the first switch connects to and receives the downlink service signals from a downlink direction of the backup path, and the output port of the first switch connects and outputs the downlink service signals to a local drop path**;

transmitting **uplink** ~~the uplink~~ service signals **received** from **a local** ~~the local~~ device respectively to **an uplink** ~~the uplink~~ direction of the working path and one of **two input** ~~the input~~ ports of **a second** ~~the second~~ switch when transmitting the signals, **wherein the second switch has two unidirectional input ports and one unidirectional output port, one input port of the second switch connects to and receives the uplink service signals from a local add path, the other input port of the second switch connects to and receives the downlink service signals from the downlink direction of the backup path and the output port of the second switch connects to the uplink direction of the backup path; the local add path is connected with the uplink direction of the working path at the same time**; and

controlling the second switch to choose ~~one path of the signals from the local~~ **the** uplink service signals **or the** ~~and the~~ downlink service signals ~~from the backup path~~, and ~~input~~ **output** the selected signals to **an uplink** ~~the uplink~~ direction of the backup path.

22. (**Currently Amended**) The method according to claim 21, **wherein** ~~**further comprising:**~~

~~**setting two switches, in the node of the optical network system, for each working path and its backup path which pass through the node, each of the switches has two input ports, wherein, one input port of the first switch connects to a downlink direction of the working path, the other input port connects to the downlink direction of the backup path, and the output port connects to a local drop path; one input port of the second switch connects to a local add path, the other input port connects to the downlink direction of the backup path and the output port connects to the uplink direction of the backup path; the local add path is connected with the uplink direction of the working path at the same time;**~~

under normal modes, the input port, which connects to the downlink direction of the working path, is connected to the output port of ~~**itself**~~**the first switch**, under the control of the first switch; the signals from the downlink direction of the backup path are input to the local drop path through the first switch; the signals from the local add path are directly input to the uplink direction of the working path;

if the node needs to enter **local** ~~**the local**~~ drop modes, the input port, which connects to the downlink direction of the backup path, is connected to the output port of ~~**itself**~~**the first switch**, under the control of the first switch; the signals from the downlink direction of the backup path are input to the local drop path through the first switch;

if the node needs to enter **local** ~~**the local**~~ add modes, the input port, which connects to the local add path, is connected to the output port of ~~**itself**~~**the second switch**, under the control of the second switch; the signals from the local add path are input to the uplink direction of the backup path through the second switch;

if the node needs to enter **express** ~~**the express**~~ modes, the input port, which connects to the downlink direction of the backup path, is connected to the output port of ~~**itself**~~**the second switch**, under the control of the second switch; the signals from the uplink direction of the backup path are input to the downlink direction of the backup path through the second switch.

23. (Original) The method according to claim 22, further comprising: controlling the second switch to open the input port, which connects to the local add path, to the output port under the normal working modes.